CLAIMS

1. A method of controlling re-routing of packet traffic from a main path to a recovery path in a label switched packet communications network in which each packet is provided with a label stack containing routing information for a series of network nodes traversed by the packet, the method comprising; signalling over the recovery path control information whereby the label stack of each packet traversing the recovery path is so configured that, on return of the packet from the recovery path to the main path, the packet has at the head of its label stack a recognisable label for further routing of the packet.

2. A method as claimed in claim 1, wherein said primary traffic paths and recovery traffic paths are defined as tunnels.

3. A method as claimed in claim 2, wherein each label in a said label stack identifies a tunnel via which a packet provided with the label stack is to be routed.

4. A method of controlling re-routing of packet traffic from a main path to a recovery path in a communications label switched packet network, the method comprising; signalling over the recovery path control information whereby each said packet traversing the path is provided with a label stack so configured that, on return of the packet from the recovery path to the main path, the packet has at the head of its label stack a recognisable label for further routing of the packet.

5. A method of controlling re-routing of an information packet via a recovery path a first protection switching node and a second protection return node disposed on a main traffic path in a communications label switched packet network in which each packet is provided with a label

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stack containing routing information for a series of network nodes traversed by the packet, the method comprising; sending a first message from the first node to the second node via the recovery path, in reply to said first message sending a response message from the second node to the first node via the recovery path, said response message containing control information, and, at the first node, configuring the label stack of the packet such that, on arrival of the packet at the second node via the recovery path, the packet has at the head of its label stack a label recognisable by the second node for further routing of the packet.

6. A method of controlling re-routing of packet traffic in a label switched packet communications network at a first node from a main path to a recovery path and at a second node from the recovery path to the main path, the method comprising exchanging information between said first and second nodes via the recovery path so as to provide routing information for the packet traffic at said second node.

7. A method of fault recovery in a communications label switched packet network constituted by a plurality of nodes interconnected by links and in which each packet is provided with a label stack from which network nodes traversed by that packet determine routing information for that packet, the method comprising; determining a set of traffic paths for the transport of packets, determining a set of recovery paths for re-routing traffic in the event of a fault on a said traffic path, each said recovery path linking respective first and second nodes on a corresponding traffic path, responsive to a fault between first and second nodes on a said traffic path, re-routing traffic between those first and second nodes via the corresponding recovery path, sending a first message from the first node to the second node via the recovery path, in reply to said first message sending a response message from the second node to the first node via the recovery path, said response message containing control information, and, at the first node, configuring the label stack of each packet traversing the recovery path such that, on arrival of the packet at the second node via the recovery path, the packet has at the

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head of its label stack a label recognisable by the second node for further routing of the packet.

8. A method of fault recovery in a packet communications network comprising a plurality of nodes interconnected by communications links, in which each packet is provided with a label stack containing routing information for a series of network nodes traversed by the packet, the method comprising; determining and provisioning a set of primary traffic paths for traffic carried over the network; determining a set of recovery traffic paths and pre-positioning those recovery paths; and in the event of a network fault affecting a said primary path, signalling an indication of the fault condition to each said node so as to re-route traffic from that primary path to a said recovery paths, and signalling over the recovery path control information whereby the label stack of each packet traversing a said recovery path is so configured that, on return of the packet from the recovery path to the main path, the packet has at the head of its label stack a recognisable label for further routing of the packet.

9. A method of fault recovery in a packet communication network comprising a plurality of nodes interconnected by communication links and in which tunnels are defined for the transport of high quality of service traffic, the method comprising;

determining and provisioning a first set of primary traffic paths within said tunnels;

determining a first set of recovery traffic paths within said tunnels, and pre-positioning those recovery paths;

responsive to a fault condition, signalling to the network nodes an indication of said fault so as to provision a said recovery path thereby re-routing traffic from a main path on to that recovery path;;

signalling over the recovery path control information whereby the label stack of each packet traversing a said recovery path is so configured that, on return of the packet from the recovery path to the main path, the

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packet has at the head of its label stack a recognisable label for further routing of the packet;

determining a further set of primary traffic paths, and a further set of recovery paths;

provisioning said further set of primary traffic paths and switching traffic to said further primary paths; and

pre-positioning said further set of recovery traffic paths.

10. A method as claimed in claim 9, wherein said primary traffic paths and recovery traffic paths are defined as label switched paths.

11. A method as claimed in claim 10, wherein each said node transmits keep alive messages over links to its neighbours, and wherein said fault condition is detected from the loss of a predetermined number of successive messages over a said link.

12. A method as claimed in claim 11, wherein said number of lost messages indicative of a failure is larger for selected essential links.

13. A method as claimed in claim 12, wherein said fault detection is signalled to the network by the node detecting the loss of keep alive messages.

14. A method as claimed in claim 13, wherein said signalling of the fault detection is performed by the node as a sub-routine call.

15. A method as claimed in claim 14, wherein each said node creates a link state database which models the topology of the network in the routing domain.

16. A method as claimed in claim 7, and embodied as software in machine readable form on a storage medium.

17. A packet communications network comprising a plurality of nodes interconnected by communications links, and in which network tunnels are defined for the transport of high quality of service traffic, the network comprising; means for providing each packet with a label stack containing routing information for a series of network nodes traversed by the packet; means for determining and provisioning a set of primary traffic paths within said tunnels for traffic carried over the network; means for determining a set of recovery traffic paths within said tunnels and for pre-positioning those recovery paths; and means for signalling over a said recovery path control information whereby each said packet traversing that recovery path is provided with a label stack so configured that, on return of the packet from the recovery path to a said main path, the packet has at the head of its label stack a recognisable label for further routing of the packet.

18. A packet communications network comprising a plurality of nodes interconnected by communications links, and in which network tunnels are defined for the transport of high quality of service traffic, the network comprising; means for determining and provisioning a set of primary traffic paths within said tunnels for traffic carried over the network; means for determining a set of recovery traffic paths within said tunnels and for pre-positioning those recovery paths; and in the event of a network fault affecting one or more of said primary paths, signalling an indication of the fault condition to each said node so as to provision said set of recovery traffic paths.

19. A communications packet network comprising a plurality of nodes interconnected by communication links and in which tunnels are defined for the transport of high quality of service traffic, the network having a first set of primary traffic paths within said tunnels; and a first set of pre-positioned recovery traffic paths within said tunnels for carrying traffic in

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the event of a fault affecting one or more said primary paths, wherein the network comprises;

fault detection means responsive to a fault condition for signalling to the network nodes an indication of said fault so as to provision said first set of recovery paths;

path calculation means for determining a further set of primary traffic paths and a further set of recovery paths;

path provisioning means for provisioning said further set of primary traffic paths and said further set of recovery traffic paths; and

path switching means for switching traffic to said further primary paths.

20. A network as claimed in claim 17, wherein each said node comprises a router.

21. A network as claimed in claim 18, wherein each said router has means for transmitting a sequence of keep alive messages over links to its neighbours, and wherein said fault condition is detected from the loss of a predetermined number of successive messages over a said link.

22. A network as claimed in claim 21, wherein said number of lost messages indicative of a failure is larger for selected essential links.

23. A network as claimed in claim 22, wherein said fault detection is signalled to the network by the router detecting the loss of keep alive messages.

24. A network as claimed in claim 23, wherein said fault detection signalling is performed by the router as a sub-routine call.

25. A network as claimed in claim 24, wherein each said router incorporates a link state database which models the topology of the network in the routing domain.

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26. A network as claimed in claim 25 and comprising a multi-service protocol label switched (MPLS) network.

27. A method of controlling re-routing of an information packet via a recovery path between first and second nodes disposed on a main traffic path in a communications label switched packet network in which each packet is provided with a label stack containing routing information for a series of network nodes traversed by the packet, the method comprising; sharing information between said first and second nodes via the recovery path so as to configure the label stack of the packet such that, on arrival of the packet at the second node via the recovery path, the packet has at the head of its label stack a label recognisable by the second node for further routing of the packet.